



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/078,316	02/15/2002	Jen-Jiann Chiou	JCLA8166	5648

7590

10/08/2003

J.C. Patents, Inc.
Suite 250
4 Venture
Irvine, CA 92618

EXAMINER

ALANKO, ANITA KAREN

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 10/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/078,316	Applicant(s) CHIOU ET AL.	
	Examiner Anita K Alanko	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 5, 6, 9 and 12 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Dai et al (US 5,935,762).

Dai discloses a via hole defining process comprising:

providing a substrate 50 having a dielectric layer 80 and a patterned mask layer 92,93 (Fig.3d) formed sequentially thereon;

anisotropically etching the dielectric layer in an etching chamber to form a via hole by using the patterned mask layer as a mask (Fig.3g);

removing a portion of the patterned mask layer around the via hole in the etching chamber (Fig.3h; col.8, lines 24-28); and

removing a portion of the dielectric layer around an upper portion of the via hole with the remaining patterned mask layer as a mask (Fig.3i).

The preamble is given little patentable weight.

Claims 1, 5 and 6 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Chang et al (US 6,365,506 B1).

Chang discloses a via hole defining process comprising:

providing a substrate having a dielectric layer 23 and a patterned mask layer 31 (Fig.3D) formed sequentially thereon;

anisotropically etching the dielectric layer in an etching chamber to form a via hole by using the patterned mask layer as a mask (Fig.3E);

removing a portion 311 of the patterned mask layer around the via hole in the etching chamber (Fig.3F); and

removing a portion of the dielectric layer around an upper portion of the via hole with the remaining patterned mask layer as a mask (Fig.3G).

The preamble is given little patentable weight.

Claims 1, 9 and 12 are rejected under 35 U.S.C. 102(a) as being clearly anticipated by Liu (US 6,346,474 B1).

Chang discloses a via hole defining process comprising:

providing a substrate having a dielectric layer 12 and a patterned mask layer 14,18 (Fig.3) formed sequentially thereon;

anisotropically etching the dielectric layer in an etching chamber to form a via hole 17b by using the patterned mask layer as a mask (Fig.3);

removing a portion of the patterned mask layer around the via hole in the etching chamber (col.3, lines 43-45); and

removing a portion 17c of the dielectric layer around an upper portion of the via hole with the remaining patterned mask layer as a mask (Fig.4).

The preamble is given little patentable weight.

Claims 1, 9 and 12 are rejected under 35 U.S.C. 102(a) as being clearly anticipated by Tseng (US 6,271,128 B1).

Tseng discloses a via hole defining process comprising:

providing a substrate 100 having a dielectric layer 106 and a patterned mask layer 108 (Fig.2) formed sequentially thereon;

anisotropically etching the dielectric layer in an etching chamber to form a via hole 110 by using the patterned mask layer as a mask (Fig.2);

removing a portion of the patterned mask layer (to form patterned mask layer 108a) around the via hole in the etching chamber (Fig. 3; col.2, last line); and

removing a portion 110a of the dielectric layer around an upper portion of the via hole with the remaining patterned mask layer as a mask (Fig.4).

The preamble is given little patentable weight.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 9-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tseng (US 6,271,128 B1).

The discussion of Tseng from above is repeated here.

As to claim 10, Tseng discloses that the patterned mask layer comprises a photoresist material (col.2, line 59). Tseng does not disclose that the photoresist is a spin-on polymer. Examiner takes official notice that photoresist layers are conventionally a spin-on polymer. It would have been obvious to one with ordinary skill in the art to use a spin-on polymer for the photoresist in the method of Tseng because it is a conventional form of photoresist material.

Claims 1, 9-11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tseng (US 6,271,128 B1) in view of Kofuji et al (US 2003/0008509 A1).

The discussion of Tseng from above is repeated here.

As to claim 11, Tseng discloses that the patterned mask layer comprises a photoresist material (col.2, line 59). Tseng does not disclose that the photoresist is an organic low dielectric constant material. Kofuji teaches that a low dielectric constant film 5 is a useful etch mask for patterning dielectric layers 4 (paragraph [0008], step 14).

It would have been obvious to one with ordinary skill in the art to use an organic low dielectric constant material for the photoresist in the method of Tseng because Kofuji teaches that it is a useful mask material for patterning dielectric layers.

Claims 1-2, 5-6, 9-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dai et al (US 5,935,762).

The discussion of Dai from above is repeated here.

As to claim 10, Dai discloses that the patterned mask layer comprises a photoresist material (col.6, line 6). Dai does not disclose that the photoresist is a spin-on polymer. Examiner takes official notice that photoresist layers are conventionally a spin-on polymer. It would have been obvious to one with ordinary skill in the art to use a spin-on polymer for the photoresist in the method of Dai because it is a conventional form of photoresist material.

Claims 1-6, 9-10, 12-17, 20-21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dai et al (US 5,935,762) in view of Allen, III (US 6,533,953 B2).

The discussion of Dai from above is repeated here.

As to claims 3-4, 14-15, Dai does not disclose the power ranges used during the oxygen plasma treatment. Allen, III teaches that ranges within the range cited are well known power ranges for plasma etching (col.3, lines 17-21). It would have been obvious to one with ordinary skill in the art to use the method of plasma etching taught by Allen, III in the method of Dai which includes powers within the cited range because they are useful ranges for plasma etching to etch layers as taught by Allen, III.

As to claim 13, Dai does not explicitly disclose to perform the steps in one single etching chamber. Allen, III teaches that it is useful to perform multiple etching steps in one single etching chamber (see abstract), for example during the etching of silicon oxides (col.6, line 53), with an intervening cleaning step, to improve monitoring of the process (col.6, lines 46-47).

It would have been obvious to one with ordinary skill in the art to perform the modified method of Dai in one single etching chamber because Allen, III teaches that this is a useful technique for etching layers with improved monitoring of the process.

As to claims 16-17, Dai discloses to etch the dielectric layer with a fluorohydrocarbon (CHF_3) and argon (col.8, lines 20-23).

As to claim 20, Dai discloses that the patterned mask layer comprises a photoresist material (col.6, line 6).

As to claim 21, Dai does not disclose that the photoresist is a spin-on polymer. Examiner takes official notice that photoresist layers are conventionally a spin-on polymer. It would have been obvious to one with ordinary skill in the art to use a spin-on polymer for the photoresist in the method of Dai because it is a conventional form of photoresist material.

Claims 1-10, 12-21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dai et al (US 5,935,762) in view of Allen, III (US 6,533,953 B2) and Chiou et al (6,376,382 B1).

The discussion of modified Dai from above is repeated here.

As to claims 7-8 and 18-19, Dai discloses to etch the dielectric layer with a fluorohydrocarbon (CHF_3) and argon (col.8, lines 20-23). Dai does not disclose to use carbon monoxide or oxygen. Chiou teaches that a fluorohydrocarbon with carbon monoxide or oxygen is a useful etchant for dielectric layers (col.2, lines 58-61). It would have been obvious to one with ordinary skill in the art to etch the dielectric layer with a fluorohydrocarbon with carbon

monoxide or oxygen in the method of Dai because Chiou teaches that they are useful etchants for dielectric layers.

Claims 1, 9-13, 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tseng (US 6,271,128 B1) in view of Kofuji et al (US 2003/0008509 A1) and Allen, III (US 6,533,953 B2).

The discussion of modified Tseng from above is repeated here.

As to claim 13, Tseng does not explicitly disclose to perform the steps in one single etching chamber. Allen, III teaches that it is useful to perform multiple etching steps in one single etching chamber (see abstract), for example during the etching of silicon oxides (col.6, line 53), with an intervening cleaning step, to improve monitoring of the process (col.6, lines 46-47).

It would have been obvious to one with ordinary skill in the art to perform the modified method of Tseng in one single etching chamber because Allen, III teaches that this is a useful technique for etching layers with improved monitoring of the process.

As to claims 20-23, see the rejection of claims 9-12.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art shows method of etching via holes.

Art Unit: 1765

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K Alanko whose telephone number is 703-305-7708. The examiner can normally be reached on Monday, Tuesday and Friday, 8:00 am-4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703-305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Anita K. Alanko

Anita K Alanko
Primary Examiner
Art Unit 1765